Acute Pancreatitis Due to Insulin-Resistant Hypertriglyceridemia in Pregnancy: Successful Management with Plasmapheresis

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ÖZET

Amaç: Gebelikte hipertrigliseridemiye bağlı akut pankreatit (HTG-AP), nadir görülen ancak hem anne hem fetüs için yaşamı tehdit edici riskler taşıyan bir klinik tablodur. Bu yazıda, insülin infüzyonuna dirençli, komplike bir HTG-AP vakasının, replasman sıvısı olarak albümin kullanılarak uygulanan çoklu plazmaferez seansları ile başarılı yönetimi sunulmaktadır.

Olgu: Gestasyonel diabetes mellitus ve obezite (VKİ ~36 kg/m²) tanılı, 33 haftalık gebe, 31 yaşında nullipar bir kadın hasta; karın ağrısı, bilateral alt ekstremite ödemi ve dispne ile başvurdu. Trigliserid düzeyi 8904 mg/dL, amilaz 401 U/L, lipaz 684 U/L olarak saptandı. Kontrastsız batın MRG'de pankreatik ödem, T2 sinyal artışı ve peripankreatik inflamatuvar değişiklikler izlendi. Yatışın ikinci gününde metabolik asidoz (pH 7,26; HCO_3 13,8 mmol/L; laktat 3,4 mmol/L), akut böbrek yetmezliği ve hipoksi gelişmesi üzerine hasta yoğun bakım ünitesine (YBÜ) devredildi. İnsüline dirençli seyir nedeniyle albümin replasman sıvısı kullanılarak plazmaferez başlandı; toplam beş seans (üçü YBÜ'de, ikisi serviste) uygulandı. Altı günlük YBÜ takibi sonrası servise devredilen hastada, gebeliğin 36. haftasında elektif sezaryen ile sağlıklı bir yenidoğan dünyaya getirildi.

Makalenin Geliş Tarihi: 11/06/2026 - Makale Kabul Tarihi: 19/06/2026
Sorumlu Yazar: Can Ömür
DOİ:10.17932/IAU.ASD.2015.007/asd_v012i2004

Sonuç: Komplike, insüline dirençli gestasyonel HTG-AP'de erken dönem plazmaferez, klinik tabloyu hızla iyileştiren ve olumlu maternal-fetal sonuçlar sağlayan etkili bir tedavi seçeneğidir. Replasman sıvısı olarak albüminin tercih edilmesi alerjik komplikasyon riskini azaltmaktadır. Görüntülemede kontrastsız MRG kullanımı ve doğumun 36. haftaya planlanması, multidisipliner yönetim yaklaşımının kritik bileşenlerini oluşturmaktadır.

Anahtar Kelimeler: *hipertrigliseridemi, akut pankreatit, gebelik, plazmaferez, yoğun bakım.*

Gebelikte İnsülin Dirençli Hipertrigliseridemiye Bağlı Akut Pankreatit: Plazmaferez ile Başarılı Tedavi

ABSTRACT

Aim: Hypertriglyceridemia-induced acute pancreatitis (HTG-AP) in pregnancy is a rare but life-threatening condition that carries both maternal and fetal risks. In this report, we present the successful management of a complicated case of HTG-AP refractory to insulin infusion, treated with multiple sessions of plasmapheresis using albumin as the replacement fluid.

Case: A 31-year-old nulliparous woman at 33 weeks of gestation with a diagnosis of gestational diabetes mellitus and obesity (BMI ~36 kg/m²) presented with abdominal pain, bilateral lower extremity edema, and dyspnea. Triglyceride level was 8904 mg/dL, amylase 401 U/L, and lipase 684 U/L. Non-contrast abdominal MRI revealed pancreatic edema, elevated T2 signal, and peripancreatic inflammatory changes. On the second day of hospitalization, metabolic acidosis (pH 7.26, HCO_3 13.8 mmol/L, lactate 3.4 mmol/L), acute kidney injury, and hypoxia developed, necessitating transfer to the intensive care unit (ICU). Due to the insulin-refractory course, plasmapheresis with albumin as the replacement fluid was initiated; a total of five sessions were performed — three in the ICU and two on the ward. The patient was transferred to the ward after a six-day ICU stay, and a healthy neonate was delivered by elective cesarean section at 36 weeks of gestation.

Results: In complicated, insulin-resistant gestational HTG-AP, early plasmapheresis is an effective treatment option that rapidly improves the clinical picture and yields favorable maternal and fetal outcomes. The preference for albumin as the replacement fluid reduces the risk of allergic complications. The

use of non-contrast MRI for imaging and planning delivery at 36 weeks constitute critical components of the multidisciplinary management approach.

Keywords: *hypertriglyceridemia, acute pancreatitis, pregnancy, plasmapheresis, intensive care.*

INTRODUCTION

Pregnancy is a process that leads to profound physiological changes in maternal lipid metabolism. Progesterone primarily initiates maternal fat storage. Subsequently, as the second and third trimesters begin, rising levels of estrogen and human placental lactogen result in insulin resistance, increased lipogenesis, and secretion of triglyceride-rich lipoproteins. (Cruciat et al., 2020) As a result of these physiological processes, serum triglyceride (TG) levels may increase approximately two- to fourfold compared to pre-pregnancy values. It has been reported that this increase may rise to particularly high levels, reaching pathological ranges, in individuals with baseline hypertriglyceridemia or those who discontinue TG-lowering medications due to pregnancy. (Chamerski et al., 2026); (Madden et al., 2024) Although this increase is generally well tolerated, in individuals with additional risk factors such as gestational diabetes mellitus (GDM), obesity, or familial dyslipidemia, it may far exceed physiological limits, predisposing to serious maternal and fetal complications. (Price et al., 2024)

Acute pancreatitis is a rare but life-threatening abdominal emergency seen in pregnancy. The incidence of acute pancreatitis in pregnancy is approximately one per 1,000 to 10,000 pregnancies, and the majority of cases present in the third trimester or early postpartum period. (Cruciat et al., 2020) The most common etiological cause is biliary disease. Hypertriglyceridemia, however, is responsible for approximately 1–9% of acute pancreatitis cases in pregnancy (Mosavi & Romanelli, 2024) and ranks third in the etiological order (Gao & Li, 2024). When serum TG levels exceed 1000 mg/dL, the risk of developing acute pancreatitis is reported at 5% in healthy individuals and 4% in pregnant patients. (Mañas García et al., 2017) Hypertriglyceridemia-induced acute pancreatitis (HTG-AP) is associated with higher complication rates and a more severe clinical course compared to other etiological causes. When left untreated, the maternal mortality rate has been reported to reach approximately 20%. (Gupta et al., 2022)

The clinical course of HTG-AP in pregnancy can be extremely severe in terms of both systemic and pregnancy-specific complications. Systemic complications include acute kidney injury, acute respiratory distress syndrome (ARDS), disseminated intravascular coagulation (DIC), sepsis, and multiple organ failure.

(Gupta et al., 2022) It has also been reported that hypertriglyceridemia causes endothelial dysfunction and placental ischemia, thereby increasing the risk of preeclampsia, HELLP syndrome, and placental abruption. It is emphasized that these complications may ultimately necessitate the decision for unplanned early delivery. (Madden et al., 2024) Peritoneal fluid accumulation secondary to pancreatic inflammation may collect beneath the diaphragm and pass into the pleural space, potentially leading to bilateral pleural effusion. This situation may worsen the patient's clinical picture and result in respiratory failure. (Gao & Li, 2024) Among the reported pregnancy-specific complications are preterm labor, fetal distress, intrauterine growth restriction, and placental insufficiency. (Price et al., 2024; Gupta et al., 2022) The potentially devastating effects of all these complications on both mother and fetus make rapid diagnosis of HTG-AP and its immediate management by a multidisciplinary team absolutely necessary.

Multiple factors contribute to the particularly severe course of hypertriglyceridemia in pregnancy. GDM reduces lipoprotein lipase activity by increasing insulin resistance and impairs TG clearance. (Price et al., 2024) Obesity and high BMI are also among the recognized independent risk factors. (Marques Puga et al., 2024) The mechanism by which markedly elevated TG levels lead to pancreatitis is explained by the hydrolysis of triglycerides via pancreatic lipase, during which released free fatty acids damage the endothelium and trigger a local inflammatory response. (Gao & Li, 2024)

The management of HTG-AP in pregnancy is challenging, as the goal is to protect both maternal and fetal health simultaneously while keeping potential harm to a minimum. Imaging options are limited, and the available pharmacological agents are restricted. Close monitoring is required since the obstetric picture may deteriorate rapidly. First-line treatment includes bowel rest, intravenous fluid resuscitation, and insulin infusion. (Mosavi & Romanelli, 2024) In insulin-refractory cases, however, therapeutic plasma exchange (plasmapheresis) has emerged as an effective method for rapidly lowering serum TG levels. (Sivakumaran et al., 2009) Evidence for the use of plasmapheresis in pregnancy remains limited to case reports and small series. (Nasa et al., 2025)

In this report, we present a case of insulin-refractory acute lipemic pancreatitis presenting at 33 weeks of gestation in a 31-year-old nulliparous woman with gestational diabetes. The patient's clinical course was complicated by acute kidney injury, metabolic acidosis, and hypoxia, and management required multiple sessions of albumin-based plasmapheresis conducted in the intensive care unit.

This case aims to draw attention to the multidisciplinary management of this rare but life-threatening clinical condition and to the role of plasmapheresis in complicated gestational pancreatitis.

CASE REPORT

A 31-year-old nulliparous woman who was being followed with diet alone for gestational diabetes mellitus (GDM) presented to the emergency department at 33 weeks of gestation with complaints of progressively worsening abdominal pain over approximately three days, bilateral lower extremity edema, and mild dyspnea. Written informed consent was obtained from the patient.

The patient had no additional chronic diseases and no medication use in her past medical history, and to the best of her knowledge there was no family history of hyperlipidemia. Her obstetric history was G1P0, and no complications other than GDM had been identified during the current pregnancy.

Table 1. Vital signs on admission

Parameter	Value
Temperature	36.8°C
Heart Rate	110 bpm
Blood Pressure	130/80 mmHg
SpO_2	94% (room air)
Respiratory Rate	20/min
GCS	15 (E4V5M6)
BMI	~36 kg/m² (110 kg / 175 cm)

On physical examination, the patient's general condition was moderate, and she was cooperative and oriented. Vital signs on admission are presented in Table 1. Although abdominal examination was suboptimal in this pregnant patient, tenderness was present in all four quadrants. Crackles were heard on auscultation of the lung bases, and pitting edema was detected in the lower extremities. As a lipid layer was observed to form in the blood samples collected during the emergency department visit, the triglyceride level was measured and found to be 8904 mg/dL. Concurrently measured amylase was 401 U/L and lipase 684 U/L — both markedly elevated. Other laboratory findings at admission are summarized in Table 2. AST and ALT could not be reliably assessed due to optical interference from the lipid-rich lipemic serum.

Table 2. Laboratory findings on admission

Parameter	Value	Interpretation
Triglycerides	8904 mg/dL	↑↑↑
Amylase	401 U/L	↑
Lipase	684 U/L	↑
CRP	190 mg/L	↑
Procalcitonin	0.27 µg/L	↑
WBC	17,250 /µL	↑
Hemoglobin	13.7 g/dL	N
Hematocrit	29%	N
Platelets	314,000 /µL	N
Creatinine	1.36 mg/dL	↑
BUN	7 mg/dL	N
Total Bilirubin	1.28 mg/dL	↑
ALP	89 U/L	N
LDH	305 U/L	↑
Blood Glucose	112 mg/dL (postprandial)	N
AST / ALT	Lipemic sample — could not be assessed	

Ultrasonographic evaluation of the abdomen in this pregnant patient showed intrahepatic bile ducts of normal caliber; however, the pancreas and common bile duct could not be clearly visualized due to insufficient image quality. Non-contrast abdominal magnetic resonance imaging (MRI) was therefore planned. The MRI report indicated that the pancreatic volume was increased, the T2 signal was elevated, and there were signal changes consistent with edema and inflammation in the peripancreatic region and mesentery, while the common bile duct was normal (Figures 1–3). When the clinical picture, laboratory findings, and imaging results were assessed together, the patient was admitted to the gastroenterology ward with a diagnosis of acute lipemic pancreatitis.

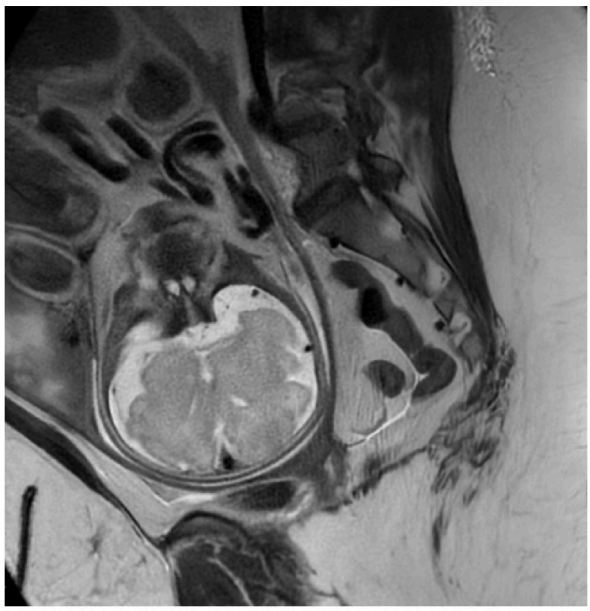

Figure 1. Sagittal T2 MRI: The fetus is visualized within the uterus. Elevated T2 signal in the region of the pancreas and peripancreatic inflammatory changes are observed in the upper abdomen.

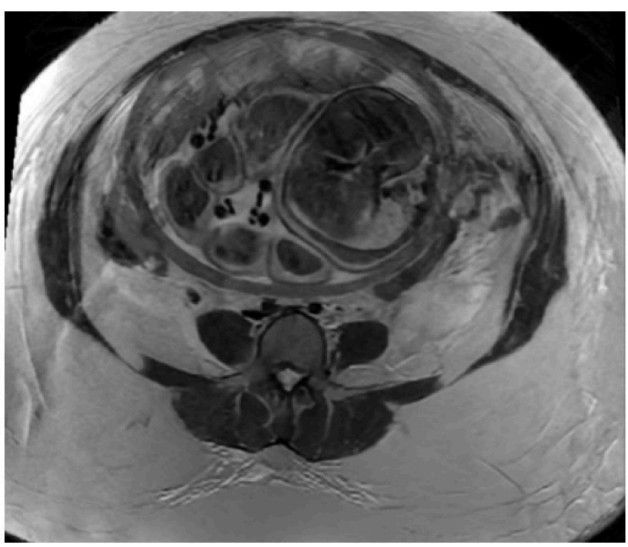

Figure 2. Axial T2 MRI: Enlargement of the pancreatic volume, elevated T2 signal, and peripancreatic edema with inflammatory changes in the mesentery are demonstrated.

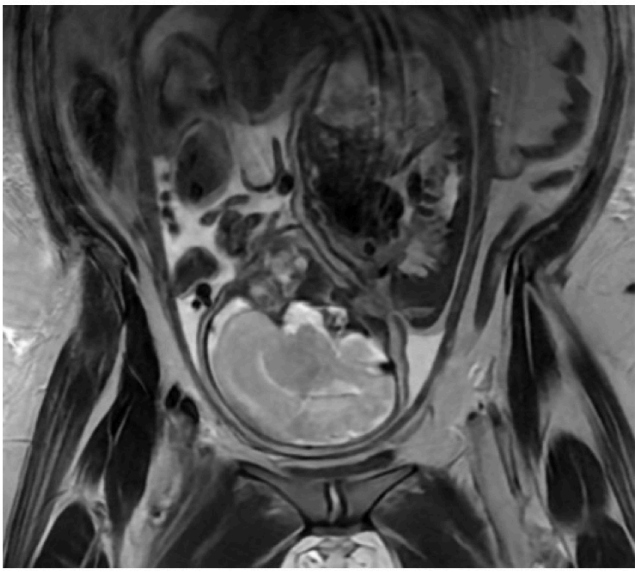

Figure 3. Coronal T2 MRI: A broad-field view of the relationship between the pancreas and adjacent structures, demonstrating the pattern of peripancreatic edema and inflammation.

An insulin infusion was started in ward follow-up; intravenous normal saline fluid support was provided to the patient who was unable to take oral nutrition due to nausea and abdominal pain. On the second day of admission (August 17), worsening abdominal pain, a marked decrease in urine output, metabolic acidosis findings on venous blood gas, and the development of hypoxia led to transfer of the patient to the intensive care unit (ICU). Venous blood gas values at the time of ICU transfer are presented in Table 3. The bilateral crackles heard on lung auscultation were evaluated as a complication of pancreatitis resulting from diffusion of peripancreatic inflammatory fluid from beneath the diaphragm into the pleural space; imaging was avoided in order to prevent additional radiation exposure to the fetus. Non-stress test (NST) and ultrasonographic evaluation performed by the gynecology team confirmed that fetal development and cardiac activity were continuing normally.

Table 3. Venous blood gas and respiratory parameters at ICU transfer

Parameter	Value	Interpretation
pH	7.26	↓ (Acidosis)
pCO_2	30 mmHg	↓ (Compensatory hypocapnia)
HCO_3	13.8 mmol/L	↓
Lactate	3.4 mmol/L	↑
SpO_2	94% (nasal cannula 4 L/min)	↓

Following evaluation with the endocrinology unit, it was decided to perform plasmapheresis with albumin solution given the insulin-refractory course and the complex clinical picture. The determining factors in preferring albumin over fresh frozen plasma were its lower risk of allergic reactions and the expectation that it would be better tolerated by the patient. The first plasmapheresis session was performed on ICU day one (August 17) with a plasma exchange volume of 4 liters; following the procedure, the triglyceride level fell to 159 mg/dL. However, a rebound elevation to 1941 mg/dL was observed the following day (August 18). Second and third plasmapheresis sessions were performed on August 20 and August 22, respectively. With clinical improvement, normalization of renal function tests (creatinine 0.61 mg/dL after the first session), resolution of the need for oxygen support, and correction of metabolic acidosis, the patient was transferred to the gastroenterology ward after a total of six days in the ICU.

A fourth plasmapheresis session was performed on August 29 and a fifth on September 4 during the ward follow-up period. The course of triglyceride values throughout the treatment process is shown in Table 4. At 36 weeks of gestation, an elective cesarean section decision was made with the aim of ensuring that hypertriglyceridemia control, which could not be achieved at a sufficient level, would be maintained and potential complications would be prevented; 36 weeks was considered the earliest appropriate time window at which the neonate could be delivered with minimal morbidity. A healthy neonate was delivered by cesarean section. At discharge, fenofibrate and omega-3 were initiated; the decision regarding the use of statins for hyperlipidemia management during the hospital stay and at discharge was deferred in consideration of the obstetric period.

Table 4. Course of triglyceride values throughout the treatment process

Date	Triglycerides (mg/dL)	Notes
August 15 (Admission)	8904	—
August 16	7064	—
August 17	**159**	**1st Plasmapheresis (ICU — Day 1)**
August 18	1941	Rebound elevation
August 19	1622	—
August 20	**1322**	**2nd Plasmapheresis (ICU — Day 4)**
August 22	**1190**	**3rd Plasmapheresis (ICU — Day 6) / Transfer to ward**
August 24	1415	—
August 25	1449	—
August 27	784	—
August 29	**453**	**4th Plasmapheresis (Ward)**
August 30	1162	—
September 1	819	—
September 4	**1323**	**5th Plasmapheresis (Ward)**
September 5	784	—
September 6	870	—
September 7	1229	Delivery by cesarean section
September 8	1236	Fenofibrate and omega-3 initiated
September 10	1192	—
September 12	1149	—
September 15	824	—
September 16	677	Discharge
September 30	825	First outpatient follow-up (ezetimibe added)

DISCUSSION

In the presented case, the coexistence of multiple risk factors laid the groundwork for an exceptionally severe clinical picture. The synergistic effect of a GDM diagnosis, obesity (BMI ~36 kg/m²), and third-trimester pregnancy in a 31-year-old nulliparous patient drove the serum TG level to a life-threatening value of 8904 mg/dL. The suppression of lipoprotein lipase activity and impairment of TG clearance resulting from the insulin resistance caused by GDM constitute an important pathophysiological mechanism superimposed on the physiologically

lipemic milieu of pregnancy. (Price et al., 2024) The contribution of obesity to this picture must not be overlooked; high BMI is recognized as an independent risk factor for hypertriglyceridemia. (Marques Puga et al., 2024) Although no family history of hyperlipidemia was known to the patient, given the severity of the clinical picture, the presence of an underlying hereditary lipid disorder cannot be fully excluded; comprehensive lipid genetic evaluation is therefore recommended following discharge.

The worsening of the clinical picture despite insulin infusion in our patient — acute kidney injury, metabolic acidosis (pH: 7.26, HCO_3: 13.8 mmol/L, lactate: 3.4 mmol/L), and hypoxia — made the application of plasmapheresis mandatory. Plasmapheresis is a mechanical treatment option that has been reported to reduce TG levels by 49–97% in a single session and is particularly prominent in insulin-refractory cases. (Nasa et al., 2025; Sivakumaran et al., 2009) In a retrospective ICU cohort study, the SOFA score in patients receiving early plasmapheresis significantly decreased from 4 points at admission to 2 points at discharge ($p=0.017$), and in-hospital mortality was 0%. (Krauß et al., 2023) The decrease in TG from 8904 mg/dL to 159 mg/dL after the first session clearly demonstrated this efficacy in our case as well.

When the risks that could be anticipated in the absence of plasmapheresis are considered, it is clear that the existing acute kidney injury and metabolic acidosis would have progressed rapidly, with complications such as pancreatic necrosis, sepsis, and multiple organ failure potentially developing. Beyond these, it should not be forgotten that hypertriglyceridemia can also lead to severe obstetric complications such as preeclampsia, HELLP syndrome, and placental abruption through placental ischemia and endothelial dysfunction. (Madden et al., 2024) The maternal mortality rate of untreated severe HTG-AP in pregnancy has been reported to reach approximately 20%. (Gupta et al., 2022) In a systematic review of 91 patients, it was reported that 96.7% of patients treated with plasmapheresis recovered and were discharged, with a mortality rate of only 3.3%; successful maternal outcomes were reported in 14 of 15 pregnant patients. (Nasa et al., 2025) On the other hand, plasmapheresis also has its own procedural complications: hypotension, hypocalcemia, loss of coagulation factors, allergic reactions, and catheter-related infections are among the foremost. (Santos et al., 2022) The absence of any plasmapheresis-related complications in our patient underscores the importance of appropriate patient selection and careful procedural management. In a complicated and insulin-refractory clinical picture, the potential benefits of plasmapheresis appear to clearly outweigh its risks.

Either fresh frozen plasma (FFP) or albumin may be used as the replacement fluid in plasmapheresis. The theoretical advantage of FFP is that it contains lipoprotein lipase (LPL) and may provide an additional contribution to TG clearance; however, demonstrating this advantage consistently in clinical studies has proved difficult. (Hussein, 2024) Albumin, by contrast, is an option that keeps the risks of transfusion reactions, transfusion-related acute lung injury (TRALI), and infectious disease transmission significantly lower compared to FFP. (McLeod, 2006) In our case, albumin was preferred given that the immunological response in this pregnant patient could follow a more unpredictable course and that allergic complications would carry additional risk for both mother and fetus. The fact that no clinically meaningful difference in TG reduction between the two fluids has been demonstrated in the existing literature also supports this choice. (Campos et al., 2017)

The rebound elevation of TG from 159 mg/dL to 1941 mg/dL on the day following the first plasmapheresis session reflects the well-characterized rebound phenomenon in hypertriglyceridemia. The continued synthesis of VLDL in the liver and the persistence of impaired peripheral TG clearance are the principal mechanisms. (Nasa et al., 2025) It has also been reported that the magnitude of the rebound cannot be predicted in advance even within the same patient, and that clinical, radiological, and biochemical parameters prove inadequate in this regard. (Nasa et al., 2025) For this reason, a single session of plasmapheresis is often insufficient, and sequential sessions in combination with insulin infusion are required. In severe HTG cases, it is recommended that plasmapheresis be applied as early as possible and repeated when necessary. (Krauß et al., 2023) The application of a total of five sessions in our patient — three during the ICU course and two on the ward — concretely demonstrates the necessity of a multi-session strategy.

Abdominal imaging in pregnancy is restricted due to concerns regarding fetal radiation exposure. The ACOG guideline recommends avoiding imaging modalities containing ionizing radiation unless necessary, while also emphasizing that CT may be used when clinically imperative. (American College of Obstetricians and Gynecologists [ACOG], 2017) In our patient, non-contrast abdominal MRI was preferred due to inadequate ultrasonography imaging. Non-contrast MRI was applied given that gadolinium-based contrast agents may cross the fetal circulation and their long-term effects have not been fully elucidated. (Puris et al., 2025) Non-contrast MRI clearly demonstrated pancreatic edema, peripancreatic inflammatory changes, and elevated T2 signal (Figures 1–3),

providing the diagnostic information that CT would have offered without fetal radiation risk. (Tremblay et al., 2012)

No additional imaging was performed for the crackles heard at the lung bases as an auscultatory finding. Refraining from additional imaging for this complication — given that it is known that peripancreatic inflammatory fluid may pass into the pleural space as a complication of pancreatitis — was a deliberate clinical choice aimed at preventing unnecessary radiation exposure to the fetus. (Gao & Li, 2024)

The deferral of the delivery decision to 36 weeks in our case required the careful establishment of a balance between the maternal clinical picture and fetal maturity. Delivery timings ranging between 32 and 37 weeks have been reported in similar cases in the literature. (Mandal et al., 2025; Tan et al., 2021) Current guidelines emphasize that delivery before 39 weeks is not indicated unless severe hypertriglyceridemia refractory to treatment is present in the third trimester, and recommend that the timing and route of delivery be determined according to routine obstetric criteria. (Madden et al., 2024) Since the clinical picture could be kept stable with plasmapheresis and supportive treatment in our patient, continuation of the pregnancy was preferred. The 36th week is recognized as the threshold at which the risk of prematurity-related complications is markedly reduced and pulmonary maturation is largely complete.

The primary rationale for not planning earlier delivery was both to reduce the risk of fetal prematurity and to ensure that the maternal picture remained manageable with medical treatment. Had hypertriglyceridemia not been brought under control or had fetal distress developed, an earlier delivery decision would have become inevitable; indeed, cases requiring emergency cesarean section have been reported in the literature. (Schaefer et al., 2024) The close collaboration maintained with the gynecology team in our patient made it possible for both maternal treatment and fetal monitoring to be conducted simultaneously and in an integrated manner.

Our case is a classic example of multidisciplinary management requiring the coordinated contributions of gastroenterology, endocrinology, intensive care, obstetrics and gynecological surgery, perinatology, and the apheresis unit. Given that HTG-AP in pregnancy simultaneously concerns two patients — mother and fetus — the direct contribution of interdisciplinary collaboration to the case outcome is clear. (Gupta et al., 2022; Price et al., 2024)

CONCLUSION

Hypertriglyceridemia-induced acute pancreatitis in pregnancy is a rare and severe clinical condition that can be successfully managed with timely diagnosis and appropriate treatment. Our case supports that multiple sessions of albumin-based plasmapheresis may be an effective and safe treatment option in a complicated, insulin-resistant gestational HTG-AP case presenting with signs of multiple organ failure. The preference for albumin as the replacement fluid is a justifiable approach in pregnant patients in that it maintains comparable TG-lowering efficacy to FFP while minimizing the risk of allergic complications. The use of non-contrast MRI for imaging eliminated fetal radiation risk while providing sufficient diagnostic accuracy compared to CT. The planning of delivery at 36 weeks demonstrates that the balance between a stable maternal picture and fetal maturity can be established through individualized and multidisciplinary assessment. The favorable maternal and fetal outcomes achieved in this case once again emphasize the decisive role of the triad of early diagnosis, prompt recourse to plasmapheresis in insulin-refractory presentations, and continuous obstetric monitoring in the management of this life-threatening clinical condition.

Consent for Publication:

Written informed consent was obtained from the patient for publication of this case report and images.

Author contributions:

Can Ömür: Study design, analysis, and interpretation, writing the article, and literature review.
Sueda Nur Yılmazel: Data Collections, Literature Review,
Özcan Alpdoğan: Literature Review, Critical Revision of the Article.

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